DOCUMENT RESUME

ED 133 146 SE 021 461

AUTHOR Ross, Catherine
TITLE Round and Round It Goes: A Study of Ecological Cycles. [Project ECOLogy ELE Pak, Roaa Pak].
INSTITUTION Highline Public Schools, Seattle, Wash.
SPONS AGENCY Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
PUB DATE [76]
NOTE 52p.; For related documents, see SE 021 438-478
AVAILABLE FROM Highline Public Schools, Instructional Division, Project ECOLogy ESEA Title III, Bill Guise, Director, 15675 Ambaum Blvd., S.W., Seattle, WA 98166 ($2.50)

EDRS PRICE MF-$0.83 HC-$3.50 Plus Postage.
DESCRIPTORS *Ecology; *Elementary Education; *Elementary School Science; *Environment; Environmental Education; *Instructional Materials; Units of Study (Subject Fields)
IDENTIFIERS Elementary Secondary Education Act Title III; ESEA Title III

ABSTRACT

This is one of a series of units for environmental education developed by the Highline Public Schools. This unit, designed for third- and fourth-grade students, emphasizes cycles and focuses on the water, oxygen, and nutrient cycles. The eleven lessons in this unit are designed to take one-half to one hour each. Use of the extra activities would increase the time for most lessons. Each lesson includes the concept of the lesson, materials needed, notes to the teacher, procedure, evaluative activities, and suggested additional activities. The materials were tried and evaluated; evaluation data may be obtained from the Highline Public Schools. (RH)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

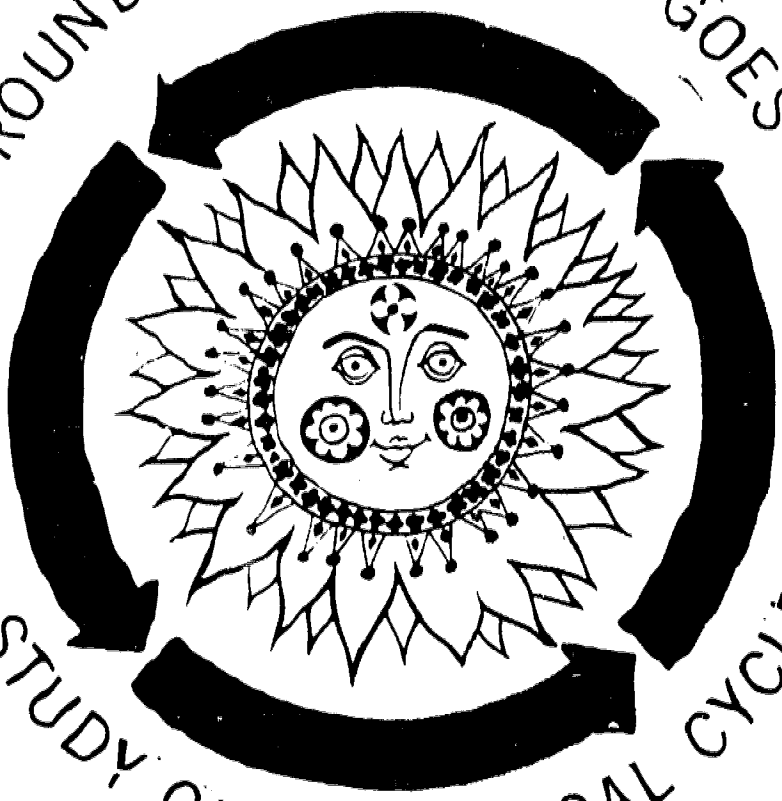
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

ED133146

ROSS

PAK

ROUND AND ROUND IT GOES



A STUDY OF ECOLOGICAL CYCLES

by Catherine Ross

An Environmental Learning Experience for 3rd-4th grade level. One of many "ELE PAKS" available for all areas.

Project ECOLogy, Title III, ESEA
Highline Public Schools
Department of Instruction
P. O. Box 66100
Seattle, WA 98166
Phone: (206) 433-2453

104 182

NATURE KNOWS BEST

The Kids Who Participated in the Pilot Evaluation Program

Andrea Zumwalt
Andy Blanchard
Bridget Rector
Camron Lusby
Colleen Westcott
Craig Smith
David Kappenman
David Springs
Dewitt Kirby
Doug Lockett
Emily Drevecky
Jeff Hase
Jeff Howard
Jimmy Hacker
John Harkness
Kathy Fields
Kenny Warner
Kim Hrisko
Lynn Garner
Melinda Brown
Melody Peterson
Michelle Landis
Mike Lofgren
Susan Wills
Terry Hildebrand
Tim Decker
Tim Dunham

The Readers Who Studied, Critiqued & Offered Suggestions & Ideas for Improvement

Kay Schrag, Pacific Science Center, Seattle, WA
Dr. Steve Flajser, University of Washington, Seattle, WA
Dr. Roger Olstad, University of Washington, Seattle, WA
Janice Tietz, Highline School District, Grade 5
Sue Horton, Highline School District, Grade 3

The Author/Teacher Who Developed This Environmental Learning Experience (ELE)

Catherine Ross — Elementary Science Consultant

The School Which Participated In The Evaluation Phase

Sue Horton
Boulevard Park Elementary
Highline Public Schools 401
Mr. Marvin Mayhle
Principal

Evaluation Results Regarding This ELE May Be Obtained by Including This Page and a Self Addressed Stamped Envelope To

Highline Public Schools, District 401
Instructional Division
Project ECOLogy ESEA Title III
Bill Guise, Director
15675 Ambaum Boulevard S. W.
Seattle, WA 98166

EVERYTHING IS CONNECTED TO EVERYTHING ELSE

EVERYTHING MUST GO SOME WHERE

THERE IS NO SUCH THING AS A FREE LUNCH

PROJECT ECOLOGY TITLE III

BACKGROUND INFORMATION

WHAT IS A CYCLE?

A cycle is a complete set of events or phenomena occurring in the same sequence.

WHAT ARE ECOLOGICAL CYCLES?

These are circular patterns of events whereby natural materials are circulated repeatedly through the environment.

WHICH CYCLES ARE USEFUL FOR A BEGINNING STUDY?

Three cycles that are essential to maintaining an ecosystem are cycles of three necessary materials for animal life: water, oxygen and nutrients.

WHAT IS THE WATER CYCLE?

The water cycle of evaporation and condensation constantly cycles the same water throughout the environment.

WHAT IS THE OXYGEN CYCLE?

The oxygen--carbon dioxide cycle shows the inter-dependence of plants and animals. Animals breathe in oxygen and breathe out carbon dioxide. Plants take in carbon dioxide and give off oxygen, when they are in the light. (In darkness, plants reverse the process, but this complexity is purposely not introduced in the unit).

WHAT IS THE NUTRIENT CYCLE?

The nutrient--decomposition cycle is the process whereby plants get nutrients (food) from the soil, then die, decompose, and become themselves nutrients in the soil for other plants. Animals eating plants enter into the cycle as well. The food chain is not introduced as such, but these lessons would serve as excellent background for a later unit on food chains.

WHY DO WE STUDY CYCLES?

The idea of cycling is a central theme in the environment. All natural materials cycle through the environment - some very quickly (such as water), and some very slowly (such as iron). All plants and animals, including man, are part of a complex recycling system which depends on the sun for energy.

HOW DO PEOPLE AFFECT CYCLES?

Unfortunately, in recent years man has not been recycling the earth's resources which he has been using in ever-increasing amounts. Cars are increasing the carbon dioxide levels in the city where there are few plants to complete the cycle by taking in the carbon dioxide and giving off oxygen. Minerals are not being restored to the earth, nutrients are not being returned to the soil, and non-decomposing materials are collecting in larger quantities on the earth's surface each year. Obviously this cannot continue indefinitely.

ARE THERE ANY POSITIVE STEPS WE CAN TAKE?

As individuals, every student can make a personal contribution to the environment by not adding to the build-up of non-decomposing materials, and by helping to recycle materials for continued use.

CONCEPTUAL OVERVIEW OF UNIT

1. Introducing the word "cycle."
2. Water goes through a cycle.
3. Humans and animals take in oxygen and give off carbon dioxide.
4. Plants use carbon dioxide and give off oxygen in the presence of sunlight.
5. Plants take up nutrients from the soil as they grow.
6. When plants die they decompose and eventually become nutrients in the soil.
7. Some materials decompose over a period of time and some do not.
8. Materials which will not decompose are building up in our environment day by day.
9. Man is working against some of the ecological cycles and thereby harming the environment.
10. Many paper products can be re-cycled instead of just thrown away after they are used.
11. Many items that we often throw away (and which do not decompose) could be recycled if everyone knew about how you do it and were willing to help.

NOTES TO THE TEACHER

The eleven lessons in this Pak are planned for a one-per-day presentation, with each lesson taking 1/2 to 1 hour. Doing the extra activities will somewhat increase the time needed for the unit, but it probably should not take less than 2 nor more than 3 weeks.

This unit was written with the intention that most of the necessary materials would be packaged in a kit, ready for use. Should this kit not be available to you, all of the materials on the master materials list can either be ordered from the service center (such as BTB or elodea), purchased at a grocery or variety store (such as a carrot or red food coloring), or are easily available (such as dirt or jars). All films and film strips listed are available from the film library at the E.R.A.C.

Throughout the PROCEDURES section of each lesson, things that you are to say to the students have been written in script type, and the directions and other instructions have been written in regular type.

The lessons were designed while keeping in mind the following child's credo:

"When I hear, I forget.
When I see, I remember.
When I do, I understand."

As much as possible, the students are given opportunities to observe and manipulate materials in groups of two or three children. Although it takes more effort on the part of the teacher to prepare for this type of lesson, the students will be the benefactors.

The evaluative activities are not intended to be reading lessons. Please read them aloud to any students who have difficulty with the words. You may want your students to make ecology folders in which to keep all of their Pak activities.

You will need to start one project three to four weeks ahead of time - see page VI for details.

A number of pages in this Pak are designed for use in machines that make ditto masters. There are also several pages to be made into transparencies.

Since the unit focuses on recycling, the use and re-use of common household containers is suggested wherever you can use them in the experiments.

I hope you and your students have as much fun working with this unit as I did putting it together!

Cathy Rose

The following items are in the kit and should be returned with it when you have completed the unit:

15 hand magnifying glasses
Pictures of trees (not evergreen) in summer, winter, fall and spring
Picture of: a garbage dump; a smoky city with air pollution evident
Copy of article "89 Things to Make Out of What You Were Going to Throw Away"
Redbook, June 1973
A lamp (may be any type; or get a socket with a plug on one end, screw a light bulb into it and plug into an outlet)
Red food coloring
Knife
Marking pencil for overhead projector
Large glass bowl or dome (such as a fish bowl)
2 ice cube trays
Sponge
Shallow dish (margarine tub would be fine)
Shallow pan (such as a cake pan

1 large clear container with a lid (such as a quart mayonnaise jar)
30 paper towels or filter papers (return remainder of box of filter papers)
15 small jars with lids (baby food jars are good - will be re-used)
15 clear plastic or glass containers larger than the jars
An egg beater
A piece of screen (approximately 12" x 12")
A piece of soft cloth (such as a dish towel)
A bowl (about 2 quart size)
Vano liquid starch
Some facial tissues (not wet-strength type) (return remainder of box)
1 cup measuring cup
1 can opener
Bromothymol blue (a chemical indicator (if not available made up into solution)

The following items are in the kit and will be replaced each time it is used:

30 styrofoam cups (will be used for 2 lessons)
45 straws
15 small plastic bags
75 paper cups
1 balloon
A small can of grapes
Some small nails
Blotter
A large plastic bag (trash bag size)

The next 2 items are too large or perishable to put in the kit - order them separately when you order the kit:

some elodea seaweed plants
about 5 lbs. of sand (8 cups)
ready made bromothymol blue solution - 2 gallons

The following items are not in the kit. You will need to gather these, or ask your students to bring them to school, as they are needed:

Tagboard for charts and dittos (large and small pieces)
Paper-fastening brads
Overhead projector
Available freezer space for freezing ice cubes
About 10 lbs. of garden dirt - get this from a yard - do not use packaged soil
Apple (you will peel it and use the peel)
Some grass clippings
Paper candy bar wrapper
3 flip-top pop cans
1 tin can
Some dry (dead) leaves
Plastic bread wrapper
Fresh carrot with greenery still on top
Some old newspapers
A 1/2 or 1-gallon milk carton
An iron

You will find a short note at the end of the preceeding lesson to remind you when it is time to bring these items.

Films and Filmstrips for lessons:

Filmstrip - How Soil is Formed
Film - The Trouble with Trash
Filmstrip - Recycling: An Ecology Study

Films and Filmstrips for suggested extra activities:

Film - Water and What it Does
Filmstrip - How Does Water get into the Air?

DO THIS FIRST - BEFORE YOU BEGIN TEACHING THE UNIT!

IMPORTANT PRE-UNIT PROJECT
(see Lesson 7)

At least three weeks before you begin this unit, set up your "decomposition bag." However, remember not to use this term "decomposition bag" with the class, because it will prematurely give away the purpose of the lesson.

This project should be done with the class, but without saying what will be done with it later. Curiosity is a good motivator - let the students speculate!

Get a large plastic bag (the kind used for trash would be very satisfactory) and put about a gallon of wet soil in it.

Add: A small can of grapes - count them as you put them in and note the number.
Some pieces of styrofoam cup - count and note the number.
Several cups of dry leaves, crumbled up.
Some grass clippings.
Some nails - count and note the number.
Three flip-tops from a soft drink can (aluminum).

Mix all these ingredients well into the wet soil, so they are distributed throughout the bag.

Tape the bag shut so it is airtight. Make sure no one opens it or tears the bag.

Mark the amounts of things inside and the date it was sealed on a card and tape it to the bag.

Put the bag in an out-of-the-way place in the room.

Hang a sign on it entitled: WHAT'S GOING ON IN HERE?

Lesson 1

CONCEPT: Introducing the word "cycle."

MATERIALS: Overhead projector and marker.
Pictures of trees (not evergreen) in spring, summer, winter and fall.
A copy of seasons cycle ditto for each child.

PROCEDURE: Write the word CIRCLE on the overhead projector with the marker.
"What is this word? What is a circle?"
Write the word CYCLE directly beneath it.
"What is this word? How are the letters alike?"
Rub out the IR of circle and write in Y.
"The word cycle comes from an old word meaning circle."

Draw a circle on the overhead projector and begin tracing slowly around it.
"When things happen in a cycle they continue to happen in a particular order around in a circle till they are back where they started and then (re-trace circle) *they start around all over again."*

"The four seasons happen in a cycle. Who can name them in order? Does it make any difference where you start? Why not?"
Write the seasons around the circle on the overhead projector.

"What else happens in a cycle?" (Possible answers: clock time, months of year, days of week, phases of the moon, tides, insect life cycle, etc. Discuss how these things happen in a circle which repeats itself.)

Have seven children form a circle. Have each one name a day of the week in order, continuing around several times. *"This is a cycle."*

Point to the seasonal cycle on the overhead. *"Some trees go through a cycle of changes as the seasons change in their cycle. What does a tree look like in winter? spring? summer? fall?"*

Show the pictures. Put them in order and tape them on the board in a circle.

EVALUATIVE ACTIVITY: Give out seasons cycle dittos. Have the children label the four sections with seasons in order, then make a picture for each season featuring a tree in the proper phase of its cycle.
"Can you "let your fingers do the walking" and walk through the cycle of the seasons?"

SUGGESTED EXTRA ACTIVITIES:

Why do we call a bicycle and a tricycle by those names?

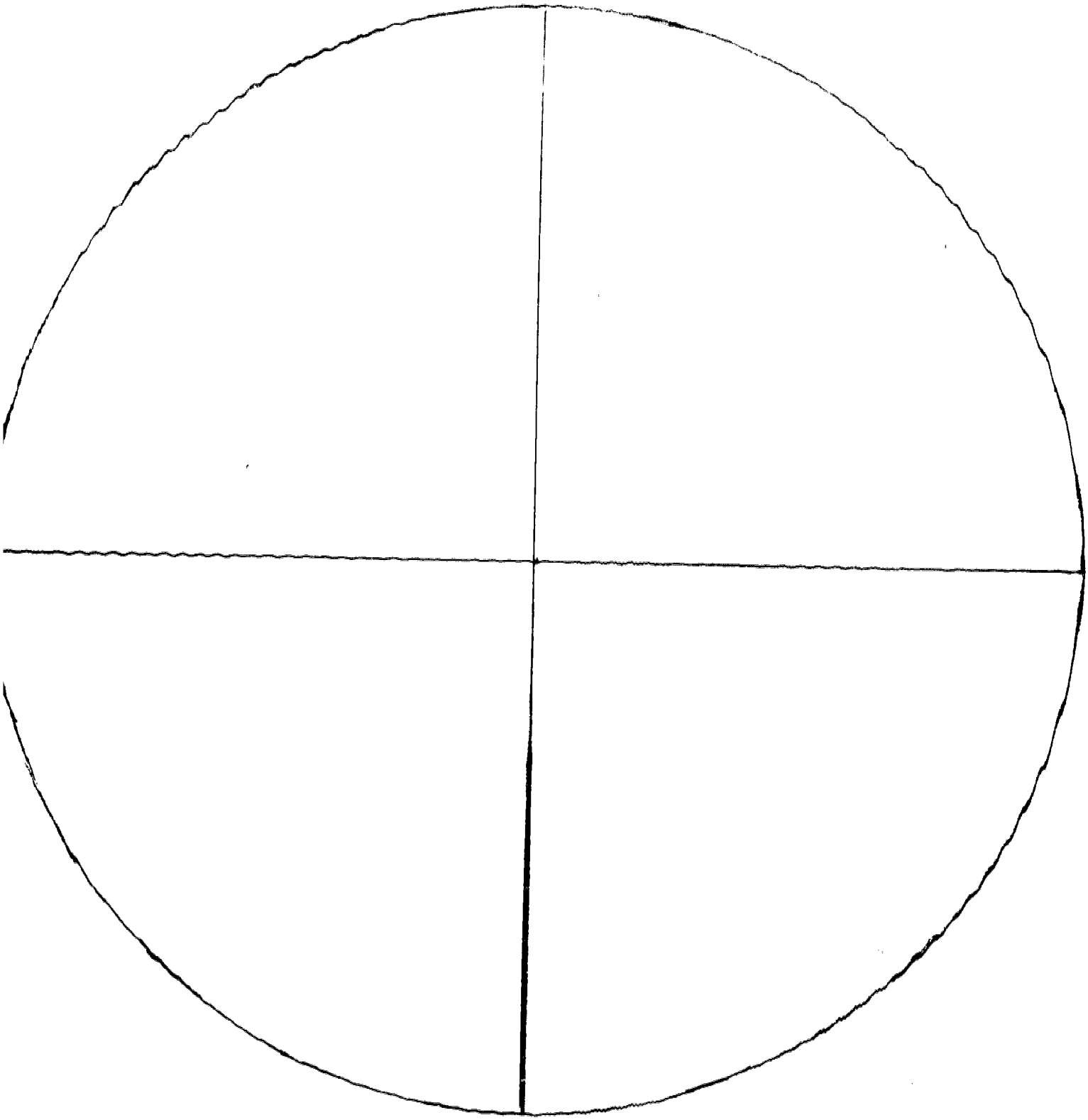
Find out about the life cycle of a butterfly and draw the steps around in a circle.

Pretend you are a leaf. Tell the story of a year in your life as you go through the seasons.

Order your BTB solution and elodea plants for Lesson 3.

SEASONS CYCLE

1-Ditto



Lesson 2

CONCEPT: Water goes through a cycle.

MATERIALS:
Dry jars with lids (1 per team)
Styrofoam cups (1 per team) - (Save these cups & use them again in Lesson 5)
Large clear plastic or glass containers (1 per team)
About 180 small ice cubes (use trays that make small cubes)
1 sponge
Cold and hot water.

PROCEDURE: *"Yesterday we learned about the word cycle – who can tell us what it means?"* (Review yesterday's lesson briefly.)

"Many things in our world go through cycles. They go through these cycles again and again. Today we are going to find out about one of them."

Erase a section of the chalkboard. Give a child a wet sponge and have him make a wet spot on the chalkboard. Ask another child to outline the wet area with chalk.

"What will happen to this water if we wait a few minutes?" Encourage predictions. Avoid saying that's right or that's wrong - allow the students to speculate.)

While you wait, divide the class into "science teams" of two, with a desk for each team to work on. (These should be carefully matched pairs of students, not random choices, since they must be able to work together compatibly and on an equal, cooperative basis.)

"What happened to the water? Where did it go?" (into the air) *"What do we call this? We say the water <u>EVAPORATES</u>."* Write the word on the board. *When it does this outside, where does the water evaporate <u>from</u>?* (lakes, rivers, etc.)

"Then what happens to it? Hold up a "handful of air." *"Is there water in this air right now? Can we see it? How can we prove that it is there? Is there a way to get the water back out of the air so we can see it again?"*

Distribute glass jars, one per team. *"Are the jars wet or dry?"* (dry). *"What will happen if we put some ice cubes in them?"* (Encourage predictions.) Fill each jar with ice cubes and pour in ice water. Put the lids on. Wait and observe. (Condensation will usually begin in 5 minutes -- by 10 minutes it is quite visible.)

"What is happening? Why are the glasses getting wet on the outside? Do they leak?" (Encourage someone to test another glass for leaking at the sink.) *"Is the water coming over the top?"* (Not with the lid on.)

"Where is this water coming from?" (the air) *"When water comes out of the air we say it <u>CONDENSES</u>."*
"When it does this outside what do we call it?" (rain or dew)

Take a sponge that has been wrung out almost dry and give it to a student. Have him collect some of the water that has condensed on each gl. s till the sponge is wet and then wipe it across the board where we left the outline of chalk.

"We are now back where we started. This water has gone through a circle or cycle---from the board to the air, from the air to the glass, and from the glass back to the board."

Give each team a styrofoam cup and a large clear plastic container. Have one team member fill the cup with hot water from the sink. (It should be very hot.)

"Now put the large container upside down on top of the cup. What will happen? Can you make the water go through its cycle? Will it evaporate? Will it condense? Can you prove it? Can you make it happen faster?" (Putting the ice on top will speed the process, but even without it, water will evaporate from the cup, condense on top of the inverted container, and drip back into the cup again. Stress that this is the same water that was in the cup.)

EVALUATIVE ACTIVITY:

1. Distribute the water cycle ditto. Have the students fill in the words on the cycle picture while discussing it as a group. Have them trace through the cycle with their fingers on the paper. They may then choose the correct words to complete the sentences. (Do read these aloud to any students having difficulty with the words.)

2. Set up the following: Take a dish of warm water, set it in the center of a pan, and invert a large glass bowl over it. Place it in a spot where it will be fairly warm (a sunny window is good.)

Ask the students to predict what will occur. (The water will evaporate from the dish, condense on the bowl, and run down into the pan. This will happen continuously and the set up may be left out for a week or so to illustrate how water re-cycles and that it is the same water going through the same cycle over and over again.)

SUGGESTED EXTRA ACTIVITIES:

What would happen if the water cycle stopped re-cycling? What if water stopped evaporating? What if water stopped condensing?

How much of what you eat and drink has water in it? How did the water get there?

Take a stopwatch and time how long it takes for water to condense on the outside of a glass of ice water on a warm day; and on a wet, rainy one. Is there any difference? Why?

Can you invent a cloud maker?

Put the same amount of water into a narrow glass and a flat dish.

Leave them both open to the air. Which one will evaporate first? Why?

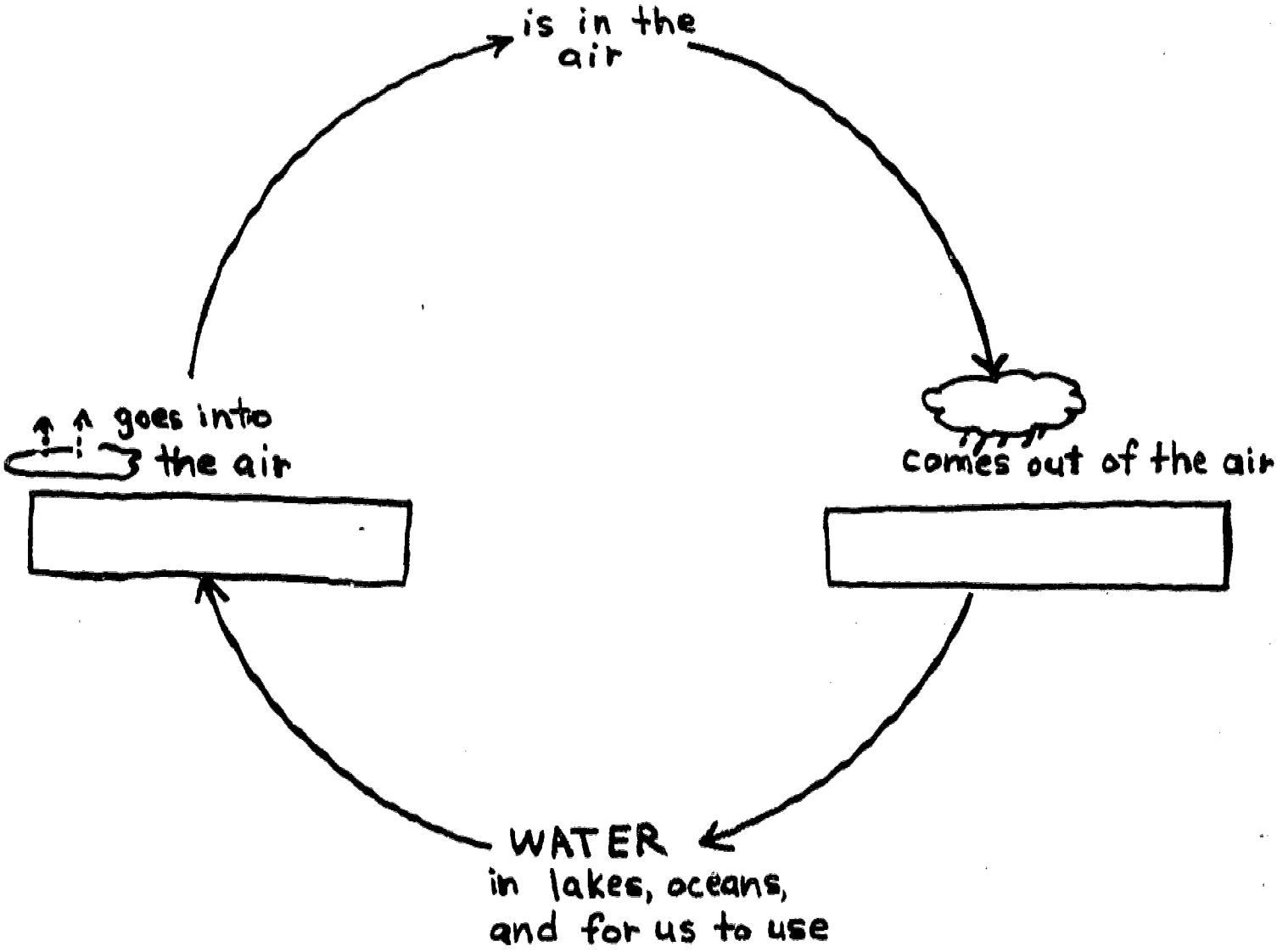
What would happen if you added some dirt to the dish of water under the dome in the experiment set up at the end of this lesson? Will the dirt evaporate and condense along with the water?

Find out how much water is on the earth and in the skies right now. Is this the same water that was here 100 years ago? 3000 years ago? Will this same water be cycling 1000 years from now? Think about this. Discuss it. (There are 326 million cubic miles of water on, in and around the earth. Each cubic mile contains a million million gallons of water! This and many more interesting facts about water may be found in the World Book Encyclopedia, 1972 edition, Volume 21, pages 92+).

Show the film strip "How Does Water Get into the Air?" (describes the process of evaporation.)

Show the film "Water and What it Does". (shows evaporation and condensation.)

THE WATER CYCLE



condenses

evaporates

Put the correct word in the right space.

WATER CYCLE

1. A cycle is like a

   circle word line

2. One example of a cycle is

   houses books seasons

3. One thing that goes through a cycle is

   water glass color

4. When water goes into the air it

   condenses evaporates melts

5. When water comes out of the air it

   condenses evaporates melts

6. When water condenses in a cloud it may fall to earth as

   wind rain dust

7. Water on the earth collects in

   jars lakes glass

Make a picture of the water cycle:

LESSON 3

CONCEPT: Humans and animals take in oxygen and give off carbon dioxide.

MATERIALS: Bromothymol blue (BTB) is a blue chemical indicator that reacts with carbon dioxide in solution and turns green or yellow. A solution of BTB and water is made with 1/4 teaspoon BTB to 1 cup water. You will need about 2 gallons of BTB solution for this lesson. If you call the service center in advance they may be able to send you the ready-made solution. Note: If you are making your own BTB solution and it comes out rather green in color to begin with, add a drop or two of ammonia to correct the color to blue before using it in the lesson.

Any type of container - (2 per team)
straws - (3 per team)
small plastic bags - (1 per team)
1 large clear container with lid
1 elodea seaweed plant
1 lamp (or any strong 24 hr. light source)
1 balloon

PROCEDURE: *"Everyone take a deep breath. Now let it out. We do this many times a day without thinking about it, but as scientists let's take a closer look at what happens."*

"There are many gases in the air - does anyone know which gas we use when we breathe in?" Discuss astronauts, scuba divers, etc., must carry oxygen in order to live out of the air.
"What about animals?" Discuss shipping boxes for animals - why do they have holes in them?

"What substance do we breathe out when we exhale? - CARBON DIOXIDE!" Write it on the board. Blow up a balloon. *"Is the "air" in here" the same as the air in the room?"*
Let air out of balloon.
"Can you see the carbon dioxide? It looks the same as regular air. Let's do an experiment to see if we can observe a difference between carbon dioxide and regular air using some water. You will be chemists doing an experiment with a chemical."

Show glass of BTB solution. Discuss chemicals briefly and stress using caution - no splashing, tasting, etc. of this substance. Show how BTB solution is made, using tap water.

Give each team of 2 the following:
2 containers of BTB solution
3 straws
1 plastic bag.

"Something happens to BTB when carbon dioxide goes into it."

Instruct them to go through the following steps:

1. "Catch" some air in the plastic bag. (Do not blow into it.) Close it at the end with your fingers.
2. Open your fingers a little and slip a straw into the closed end without letting the air out (some may need help with this). Put the end of the straw into the BTB solution.
3. Squeeze the air into the solution in one glass.
4. Observe (no change).
5. Now blow through the straw into the other glass of solution (each student can blow very gently and slowly so their breath bubbles into the water.) DO NOT SUCK UP THE BTB!
6. Observe (color change).

Discuss the experiment. *"Are the air we exhale and the air we have in the room the same? What gas is in what we exhale?"* (Carbon dioxide -- actually what we exhale is about 1/5 carbon dioxide.)
"Is there much of that gas in our air?"
(Not enough to turn the water color).
"What happens to all of the carbon dioxide we exhale? Is it part of a cycle like the water cycle?"

Fill a container with BTB water. Blow a little carbon dioxide into it until it just turns green (not too much). Put in several sprigs of elodea seaweed and put on the lid. Place this under a lamp and leave on all night (this is important, since the plant will use carbon dioxide only in light).
What do you think will happen?
(Encourage predictions.)

(This may take several days to show a color change. If you want to have a control for comparison, leave the elodea out of the control container.)

Order your sand for Lesson 5.

You will need tagboard and paper fastening brads for the next lesson.

Lesson 4

CONCEPT: Plants use Carbon dioxide and give off Oxygen.

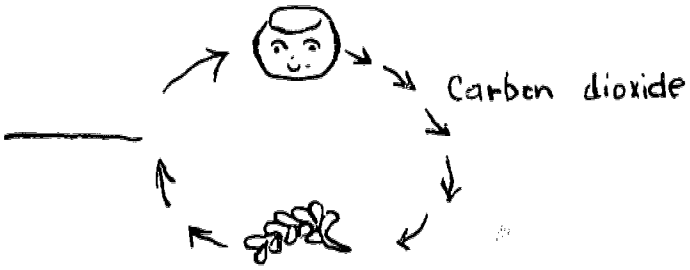
MATERIALS: Elodea seaweed in BTB solution from previous lesson.
Blank chart.
2 dittos run off on tagboard for each child.
(Make ditto masters from pages 4 - 3 and 4 - 4 ditto)
Brads (for putting the circles together).

PROCEDURE: *"What's happened to the BTB solution?"* (turned blue again)

"What does that mean has happened?" (Discuss - they should interpret the color change to mean the carbon dioxide isn't there any more).

"What do you think might have happened to the carbon dioxide?" (Discuss possibilities. Hopefully someone will suggest that the plant used it.)

Draw the following on a chart:



"The plant used what we exhale. It was _____?

"What do we need to breathe in?" (oxygen) Fill in word on the chart.
"Plants give off oxygen in the light."

"Observe the plant carefully. Can anyone find a small bubble by the leaves of the plant? What do you think these bubbles are?" (Since the plant was always in the light, any bubbles will be of oxygen).

Review the concept on the chart, moving your hand in a circle.
"This happens over and over, every day. We say it goes through a _____?" (cycle). "We call it the oxygen-carbon dioxide cycle."

EVALUATIVE ACTIVITY: Give out the oxygen-carbon dioxide cycle dittos. Have the children cut out the circles, cut away the sections as directed and put the circles together with the brads. They should be able to tape on the plant and the boy in the correct places on the circle to show the flow of carbon dioxide from the boy to the plant and the flow of oxygen from the plant to the boy.

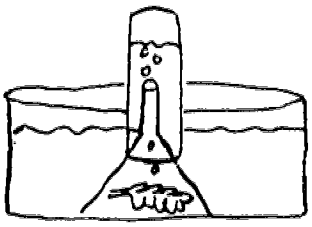
SUGGESTED EXTRA ACTIVITIES:

What would happen if there were only animals on the earth but no plants?

Why is it helpful to plant trees and grass in a city? How much oxygen will grass in a person's yard produce in a year? How much oxygen will a tree produce?

Set up the following demonstration:

Invert a funnel over an elodea in a container of water. Fill a test tube or slim glass with water and holding your thumb over the end so none of the water will come out, turn it upside down and place it underwater resting on the funnel. Place this in the sunlight or under a lamp.



The bubbles of oxygen will gradually rise from the plant and collect in the top of the tube, displacing the water.

Set up a "balanced aquarium" using aquatic snails and elodea. Guppies may also be included. Ask: *Why do we call this aquarium "balanced"? What living things in it give off carbon dioxide? What uses it? What gives off oxygen? What uses it? Can you trace the cycle?*

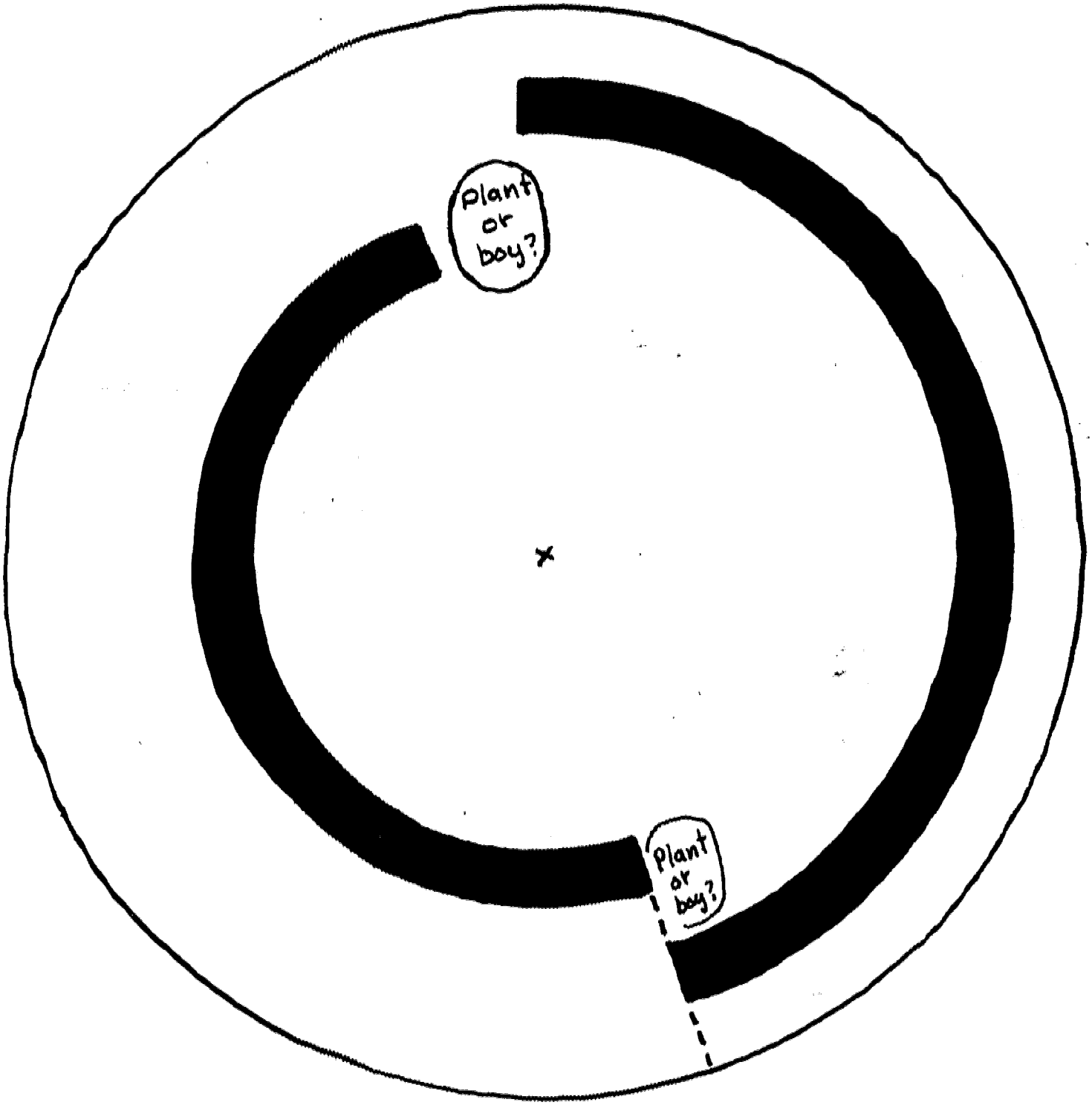
(Background information for teacher: See "The Unbalanced Aquarium" in The American Biology Teacher, September, 1968.)

Order the filmstrip for Lesson 6.

Remember to bring garden loam and a carrot with the green leaves still on it for the next lesson!

The following 2 pages are designed to use in a machine that makes ditto masters.

After the masters have been made, run copies of these on tagboard or heavy construction paper.



1. CUT OUT CIRCLE
2. CUT IN ON DOTTED LINE
3. CUT AWAY ALL THE BLACK PARTS
4. FASTEN TO THE OTHER CIRCLE AT x (THIS ONE GOES ON TOP)
5. TAPE BACK TOGETHER AT DOTTED LINE

Fasten this with a paper fastener (at x) to the other wheel. Turn with the handle and watch the words move.

CUT OUT

TURN

HANDLE

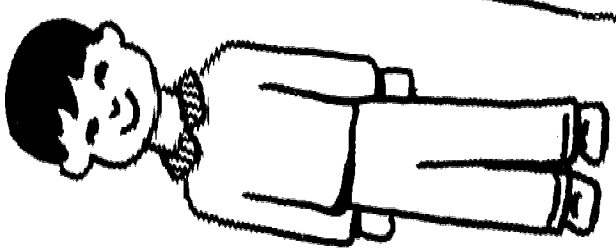
CUT OUT

CARBON DI-OXIDE

OXYGEN

CUT OUT

CUT OUT



Color the boy and the plant.
Cut them out.
Paste them on the other circle.

LESSON 5

CONCEPT: Plants take up nutrients from the soil as they grow.

MATERIALS:
Fresh carrot with green top still on.
Red food coloring
Container of water
Knife to cut off bottom tip of carrot.

First thing in the morning on the day of this lesson set this up: Put a carrot with the tip cut off in a container of water to which you have added red food coloring. Ask: *What will happen?* (Don't give the answer! Within a few hours the red color will travel up the core of the carrot and become visible on the leaves.)

MATERIALS FOR THE REST OF THE LESSON:
Clean sand (rinse it if necessary - or else it won't make a good contrast in the test)
Rich soil or loam (get this from a yard - do not use packaged soil)
Paper cups or styrofoam cups from lesson 2. Puncture some small holes in the bottom of each cup so it will make a sieve (2 per team)
Paper cups or other containers (3 per team) (no holes in these)
Paper towels cut into squares or filter papers (2 per team)
Water

PROCEDURE: *"What has happened to the carrot?"* Discuss. Cut the carrot open lengthwise to show the core. *"Where is the root on this carrot plant?"* (The carrot itself is the root.) *"What do plant roots do?"* (Carry water up to the plant.)

"What does a plant need in order to grow?" (Carbon dioxide, water, light, food).
What kind of "food" does a plant need? Does it "eat" as we do?"

"How does a plant get its food?" (refer back to carrot).
"Where does this "food" come from when it's in the ground?" (soil).

"We call this soil food by a special name: NUTRIENTS."
(Write word on board.) *"In order for the plant to use these nutrients, they must be dissolved in water so the roots can carry them up to the plant."*

Put out the container of sand and the container of loam.
"Which do you think has more nutrients in it?" (point to loam and sand)

Divide class into science teams of two as before, with a desk for each team. If you do not have a water source in your room, fill several containers with water and set them out.

"Today you will be soil analysts. These are people who test soil samples to find out what nutrients are in them. You will be filtering water through both kinds of soil and collecting the water that goes through."

"Not all nutrients can be seen when they are washed out of the soil. But, today we will measure the amount of nutrients in your soil sample by the way the water looks when it has filtered through."

Give each team the following:
2 cups with holes punched in the bottom (sieve-cups)
3 plain cups (no holes)
2 paper towel squares or paper filters
1 pencil
Task Card with directions for procedure (see ditto-5)

"Follow the directions on your card, one step at a time."

"What do you observe?" Discuss

"Which sample contained more nutrients, as measured by the way the water looks after it has filtered through? Which would be better to grow a plant in, sand or loam?"

"What would happen if we poured the water through sample B many times?" (All of the nutrients would be washed out).

"How would nutrients ever get back into soil once they were gone? What if a lot of plants grew and used up all the nutrients in some soil? Would plants grow in it then?"

"Which sample of filtered water would be best to grow plants in?" (This might make an interesting individual project for some students).

"Could we do anything to help make sample A better for growing plants? Do you or your family ever enrich your soil? How? What is in fertilizers?" (Have someone find this out and tell the class).

EVALUATIVE ACTIVITY: Have the students complete the ditto "Plants Need Nutrients"

SUGGESTED EXTRA ACTIVITIES: Make a leaf rubbing for art - notice the veins in the leaf.

Start two seeds. After they are a few inches high, put one in the filtered sand water and the other in the filtered loam water from this lesson. What will happen?

What will happen if we put the two filtered water samples in shallow dishes and allow them to evaporate? What is the residue left in the dish? Which dish has more residue?

"Can a plant grow without soil?" (Yes, elodea) *"What about a plant from your own garden - could it grow without soil?"* Get the chemicals for "soil-less plant growth" (Hydroponic Gardening) from the service center. Try growing some plants in this chemical solution. Are these the same as the "nutrients" we have learned about?

TASK CARD FOR LESSON FIVE

Make sure you have the following:

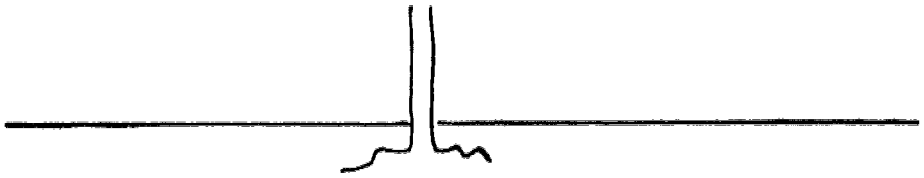
2 sieve-cups with holes in the bottom
3 plain cups
2 paper filters
a pencil

Follow these directions carefully, one step at a time:

1. Put the filters inside the bottoms of the sieve cups so that nothing can get under them.
2. Put some sand in one sieve-cup and some dirt in the other one.
3. Label the sand A and the dirt B.
4. Label one plain cup A and another plain cup B.
5. Get some water in the third plain cup.
6. Hold sieve A over cup A and slowly pour the water through the sand so it drips through into the plain cup below.
7. Get some more water in the third plain cup.
8. Hold sieve B over cup B and slowly pour the water through the dirt so it drips into the cup below.
9. What do you observe? Write your observations below:

PLANTS NEED NUTRIENTS

5-Ditto



FINISH DRAWING THE PLANT. IT CAN BE ANY KIND OF PLANT YOU WISH. SHOW THE ROOTS UNDER THE SOIL. MAKE ARROWS SHOWING HOW THE NUTRIENTS ARE CARRIED INTO THE PLANT.

READ EACH WORD ON THE WORD LIST. THEN COMPLETE EACH SENTENCE BY PUTTING THE RIGHT WORD IN THE BLANK.

1. _____ CARRY FOOD UP TO THE PLANT.
2. A PLANT GETS FOOD FROM OUT OF THE _____.
3. THE FOODS THAT PLANTS GET FROM THE SOIL ARE CALLED _____.
4. THE NUTRIENTS TRAVEL _____ THE STEM OF THE PLANT.
5. PLANTS WILL GROW BETTER IN SOIL WITH _____ NUTRIENTS.

UP
DOWN
ROOTS
NUTRIENTS
SOIL
FLOWERS
MORE
LESS

Lesson 6

CONCEPT: When plants die they decompose and eventually become nutrients in the soil.

MATERIALS: Filmstrip "How Soil is Formed."
Blank tagboard chart.

PROCEDURE: *"What did we find out about soil yesterday? How do you think nutrients get into the soil in the first place?"* (Someone may mention fertilizer).

"Does anyone fertilize the soil out in the forest?"

"Where do all the leaves go in the fall after they drop off the trees? Do they blow away? Disappear?"

Show the filmstrip "How Soil is Formed." Spend some extra time on the frames depicting the decay of leaves into soil. If this lesson is taught between December and April, you may be able to take the class on a walk and find a pile of dead leaves. Dig down into it and find the layers discussed in the filmstrip. Perhaps someone may have a compost pile that the class could examine if no piles of leaves are available.

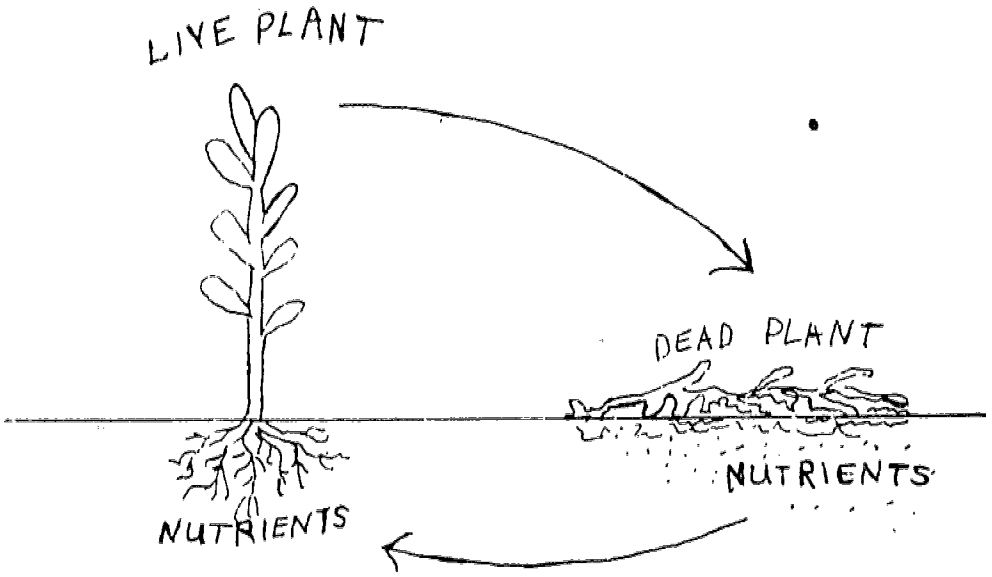
"What happens to plants when they die?" (they decay, or rot.) *"We say they DECOMPOSE."* (write word on board). *"If you COMPOSE a song you put it together -- DECOMPOSE means just the opposite -- to take apart."*

"Small organisms or bacteria help things to decompose. What things have you seen decomposing?" (Discuss rotten fruit, moldy bread, etc. -- whatever the students might mention).

"Often people don't like to have things decompose. It means, if it is food, that we can no longer eat it. Also, things that are decomposing often smell bad. Does anyone know why?" (the bacteria that help things decompose give off a gas as they work, and this is what you smell).

"Imagine for a minute what would happen if things did not decompose." (Discuss the problems it would create.)

"But it is an important part of a cycle that plants decompose when they die. When plants die and decay the nutrients that the plants took out of the soil are put back into the soil to be used again and again. This is another cycle." Draw on board or chart:



We call this the nutrient cycle. Without this cycle, all the nutrients in the soil would soon be completely used up and no more plants could grow.

EVALUATIVE ACTIVITY: Have the students complete the ditto on the next page.

SUGGESTED EXTRA ACTIVITIES:

Take a walk in the woods. Look for evidences of decomposition.

Fill 2 small containers with equal amounts of good soil. Mark where the soil level is on the container. Grow a plant in each one. When the plants are 6-8 inches high, do this:

Uproot both plants.
Discard one plant.
Cut the other one, roots and all, up into tiny pieces and bury them in the soil of one container. Plant a new plant in each container.

Repeat this once or twice until it becomes noticeable that the soil level of one container is higher than the other. Why? Discuss.

Dig up a piece of soil with plants or grass growing in it. Put it on a piece of paper and carefully take it apart. Examine it carefully. What do you see?

Get the LaMotte Soil Test Kit at the service center and have the students test various soil samples for their acidity. Find out what kind of soil is best for certain plants.

Order the film for Lesson 8.

Remember to bring some old newspapers for the next lesson!

NUTRIENT CYCLE

1. When plants die they

   compose decompose disappear

2. Dead leaves may slowly become

   water levels oxygen soil nutrients

3. When things decompose they often

   make noise smell bad get larger

4. The bacteria working to help things decompose give off a

   gas color noise

5. When plants decompose they put _____ back into the soil

   nutrients color water

Explain in your own words how plants help make soil:

_____

_____

_____

_____

Lesson 7

CONCEPT: Some materials decompose over a period of time and some do not.

MATERIALS:
Newspapers
Hand magnifying glasses (1 for every 2 students)
Bag of soil containing materials placed in it a month ago.
Cup for scooping soil.
Soil sample study sheet.

PROCEDURE: Bring out the bag of soil from wherever you stored it. *"Who remembers what we put in here? Recall materials, and numbers of them.* Write them on the board. *How long have they been in there?"*

"What do you think has happened during that time?" (Hopefully someone will suggest that some of the things may have decomposed).

"Do you think you will be able to see them? Will they have disappeared? Will all the things have decomposed?"

Divide class into science teams of 2, each with a desk to work on. Cover the desks with newspaper and give each team a magnifying glass. Have a student open the bag. Note if there is any odor. Give each team some of the dirt (about 1 cup each) until it is all distributed.

"Today you will be soil technicians. These are people who examine soil samples to find out what they are made of. You will be doing one of the things soil technicians do."

"Observe your sample carefully. Write down what you find."

Give out the soil sample study sheets. After they have finished, tally up the numbers of items found. Compare with the original list. *"Did we lose anything? What? Why?"*

"What had decomposed? How could you tell?"
"What had not decomposed? Why not?"

"Which things are part of the nutrient cycle? What will become of these things?" (they will be used by plants as nutrients -- even the rusting nail, since iron is a necessary trace element).

"What about the other things?" (they will remain -- they will not decompose).

SUGGESTED EXTRA ACTIVITIES:
What would happen if nothing ever decomposed? Look ahead to the future - what would it be like?
Collect some materials from your environment and do an original piece of art that shows how time changes your environment.

Remember to bring the items for the evaluative activity on the next lesson (see page 8-1).

Soil Sample Study

In this soil sample I found:

ITEM	YES HOW MANY?	NO	UNCHANGED?	CHANGED - HOW?
piece of styrofoam				
grape				
piece of leaf				
grass				
nail				
top of can				

Has anything decomposed? What was it?

_____

How could you tell it had decomposed?

_____

_____

_____

LESSON 8

CONCEPT: Materials which will not decompose are building up in our environment day by day.

MATERIALS: Film - "The Trouble with Trash" (This film may be too long to hold attention throughout - the scenes of mountains of garbage at the beginning will serve well as a discussion springboard without seeing all of the possible solutions given in the remainder of the film.)

PROCEDURE: *"How many things did you throw away yesterday? At home? At school? Other places?"* Discuss. (You may want each student to make a list).

"How much garbage do you think an average American throws away each day?" Encourage speculation. (Answer is over 5 lbs. a day).

"How much in a year?" (Multiply 5 x 365 -- answer is 1825 lbs. or nearly a ton).

"What happens to these things after you throw them away?"

"Then what?" (Encourage ideas as far as possible).

Show film "Trouble with Trash".
Discuss the film.

"What are some of the problems we have with trash?"
"What are some ways to solve these problems?"

EVALUATIVE ACTIVITY: Put these or similar items out on a table where all can see them.

- Apple peel
- Glass bottle
- Plastic bread wrapper
- Paper candy bar wrapper
- Flip-top pop can (this is aluminum and will not rust)
- Tin can (this is actually made of steel and will rust)

Take a piece of paper. On one side list the things that should decompose over a period of time.

On the other side, list the things that will probably still be around when you (the students in the class) are 50 years old.

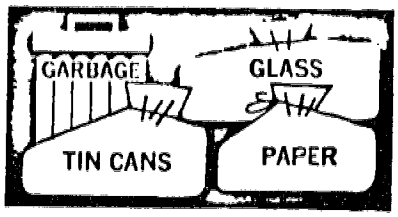
SUGGESTED EXTRA ACTIVITIES: Ask: What would happen if we tried to burn any of these items? Try burning a bit of the plastic bag in a metal pan. Note the acrid smell. Should we burn a lot of plastic? What problem do we have then? (Air pollution).

Take a "class walk" around the school grounds. How many throw-aways can you find?

"Adopt" an area of the school grounds. Keep it clean and free from litter.

Paint a garbage can with an anti-litter message and install it on the school grounds where it will be used. (Maintenance may be able to provide old paint cans to use as garbage cans.)

Discuss this with the class.



Official Advice. . . .

FIVE WAYS YOU CAN HELP EASE THE TRASH BUILD-UP

For the "recycling conscious" citizen, the Environmental Protection Agency offers these tips:

1. Put as little as possible into the trash can. Separate all newspapers, magazines, glass containers and aluminum cans. These are valuable materials that can be economically recycled if taken to a collection center. They also are the ones most easily lost to resource recovery if they get mixed up with the other garbage.

2. Buy food in large packages with minimal decorative wrappings. Avoid aerosol cans, which cost more to manufacture and are not as easily recycled, when the same product can be purchased in simpler containers.

3. Find new uses for old packages Glass jars and plastic containers can be used again as storage for food, nails, other materials.

4. Do not throw trash out of car windows. It costs an extra 25 cents per item to pick up and dispose of each bit of litter tossed along the road.

5. Crush your trash as much as possible before putting it out for collection. This cuts down on storage space, collection costs.

Lesson 9

CONCEPT: Man is working against some of the ecological cycles and thereby harming the environment.

MATERIALS: 3 charts taped up (or drawings on the board) of the 3 cycles studied, unlabeled.
Container of water; sink.
Picture of a garbage dump.
Transparencies of water and city.
Picture of an industrial city with air pollution.

PROCEDURE: Show the diagrams of the cycles.
"Who can name these three cycles on the board?"

Have students label them
WATER CYCLE
OXYGEN-CARBON DIOXIDE CYCLE
NUTRIENT CYCLE
Review each one briefly.

"Sometimes we work against these cycles and keep them from going avound as they would naturally."

Take a container and fill it with water. Now pour it down the sink: *"Where does the water go?"* (If you don't have a sink in your room, use the nearest drinking fountain.)
Show the water transparency. Discuss where it goes.

"How long will it be before it can evaporate and condense as rain and we can use it again?"

"How much water do you think your family uses in a day? (about 600 gallons for an average family of 4, counting bathing, washing clothes and dishes, drinking, cooking, etc.)

"Do we waste water? How? Will it re-cycle eventually?" (Yes, but in the meantime, while we wait, we have a reduced water supply).

"What can we do to conserve water?"

Show the city transparency and pass around picture of an industrial city.

"What is happening to the carbon dioxide-oxygen cycle here? What do the cars give off? (carbon dioxide) *The factories? The people? The tree? What is there too much of?"* (carbon dioxide). *"What is there not enough of?"* (Oxygen).

"What would improve the situation?" (Discuss fewer cars, riding bicycles, industries stopping air pollution, planting more trees and grass, fewer people, etc.)

Show a picture of a garbage dump with lots of cans and bottles.
"Will a plant grow here?"
"Are there many nutrients here?" (City trash is made up of about 50% paper, 25% metal, glass and plastic, and 25% organic materials which decompose easily, such as food wastes).

"Are all these things going to decompose and add to the soil?
"What is happening to the nutrient cycle?"
"What can you do to help?"
(Discuss composting, recycling, glass, cans, paper, not using returnable containers, littering, re-using things, etc.)

EVALUATIVE ACTIVITY: Have the students do the ditto "Ecological Cycles". They are to label the three cycles correctly and fill in the appropriate words on the blanks.

SUGGESTED EXTRA ACTIVITIES: You must build a space station that will be self-supporting and will recycle all materials. How will you do it?

Look at everything in your house. Where did the materials come from? What will become of them when you are through using them? Could any of them be recycled? How?

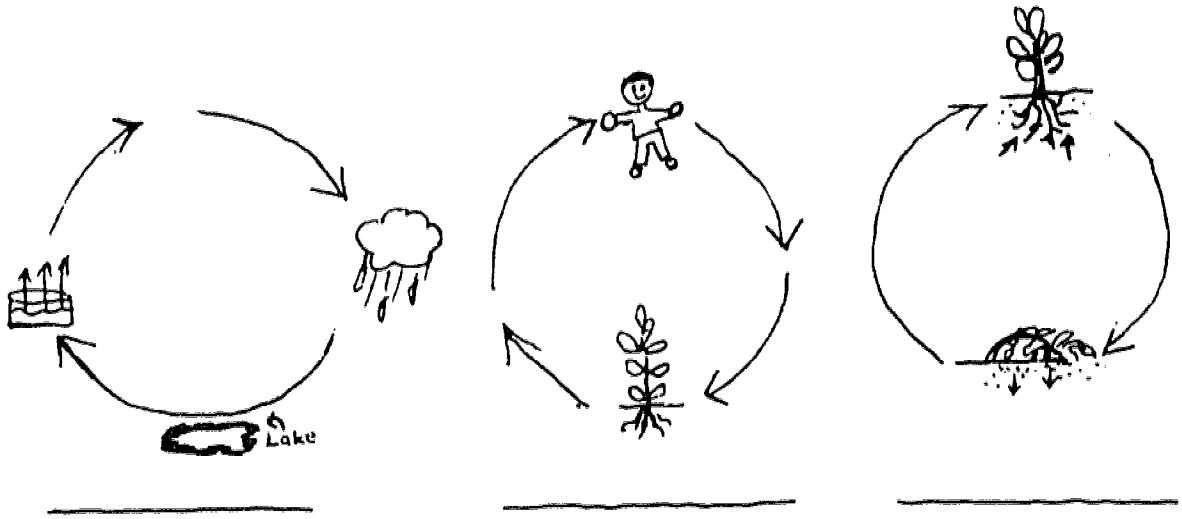
Make a diorama or display featuring one of the cycles you have studied. (For example, the water cycle could be depicted in a shoebox diorama showing a lake, cloudy skies, and rain falling - tinsel works well as pretend rain.) Show your display to the class and explain the steps in the cycle.

What may happen in the future to our earth if no one recycles anything? Think of as many possible outcomes as you can. (Example: we may run out of trees.)

Order the filmstrip for Lesson 11.

Remember to bring a large milk carton and an iron for the next lesson, plus the materials for the evaluative activity (see page 10-2)

ECOLOGICAL CYCLES



DIRECTIONS: Put the correct cycle under the proper picture.

OXYGEN-CARBON DIOXIDE CYCLE
WATER CYCLE
NUTRIENT CYCLE

Some of the following things would be good conservation practices and would tend to follow the natural cycle. Others are not good conservation practices and would tend to work against the natural cycle. Write "good" or "not good" in front of each statement.

_____ leaving the water faucet running.

_____ turning dead leaves into the soil.

_____ leaving a car engine running all day.

_____ throwing away all your bottles and cans.

_____ riding a bicycle instead of driving a car.

_____ planting trees in the city.

_____ using cans and bottles over and over again.

_____ burning dead leaves.

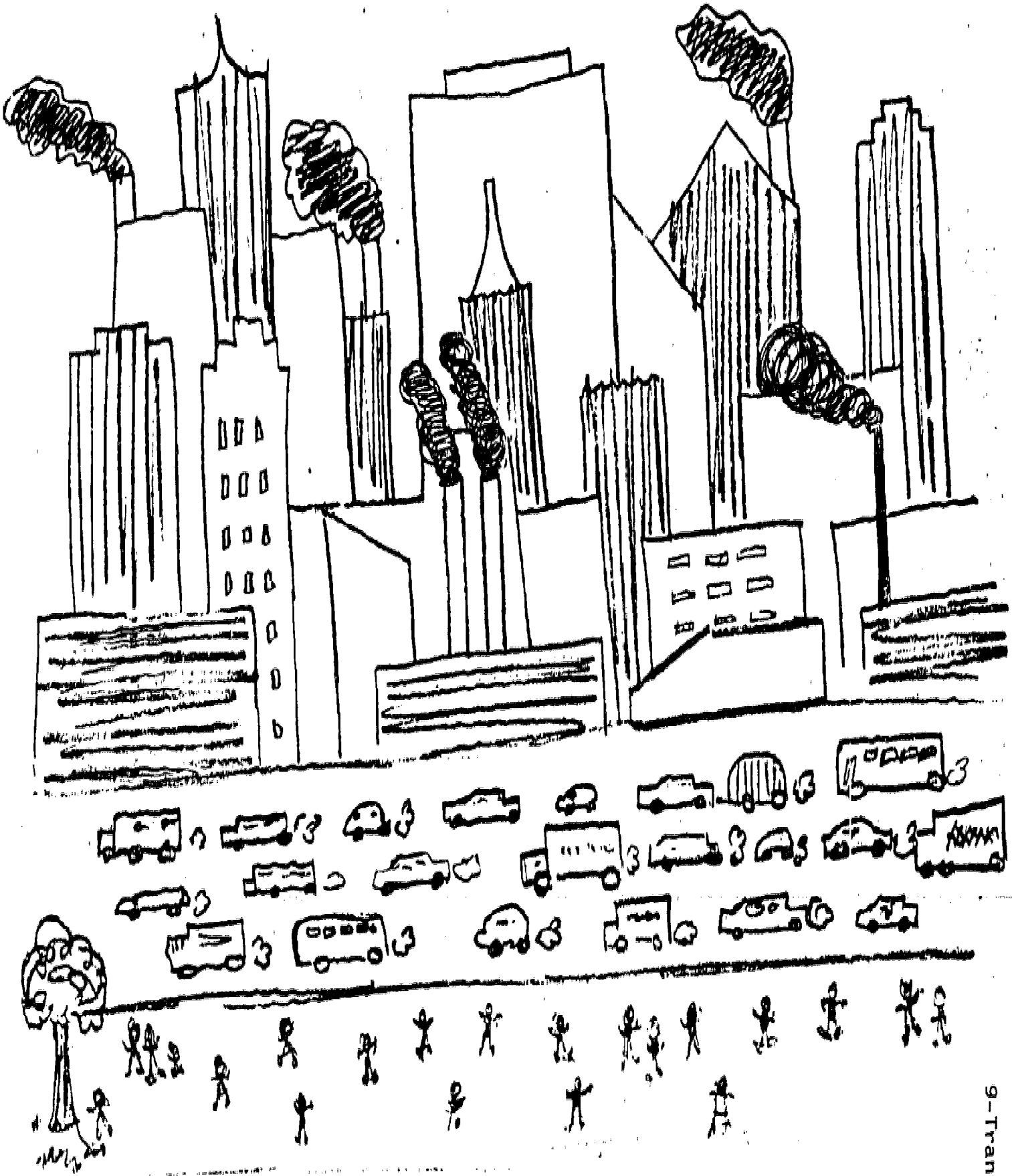
_____ using only as much water as you really need.

_____ cutting down all the trees in a city park.

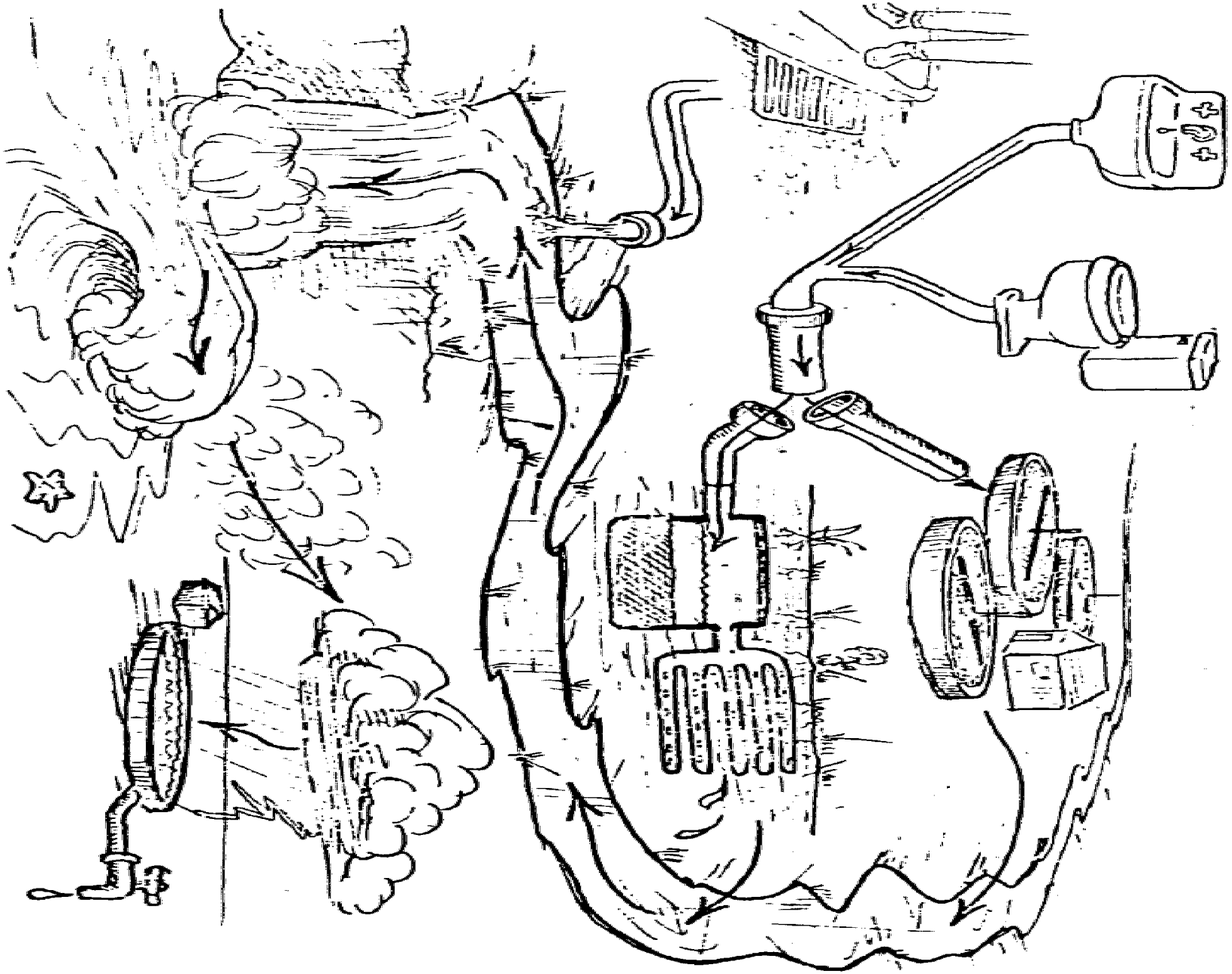
_____ letting a factory burn things that make a lot of smoke.

_____ using paper bags over and over again instead of throwing them away.

Make a transparency.



9-Trans.

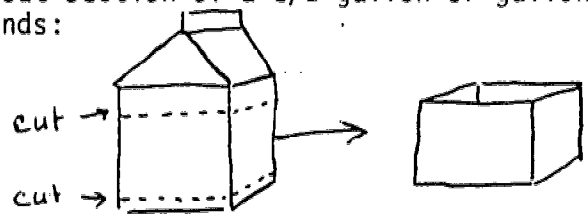


Make a transparency.

Lesson 10

CONCEPT: Many paper products can be re-cycled instead of just thrown away after they are used.

MATERIALS: A cut-out section of a 1/2 gallon or gallon milk carton, open on both ends:



Facial tissues (not "wet strength kind")
Liquid starch (such as Vano)
An egg beater, an iron, blotter paper.
(construction paper will work, but it takes longer).
A piece of screen larger than the top of the pan.
A flat pan. Cake pan from Lesson 2 is fine.
A piece of soft cloth (such as a dish towel).
A bowl.

PROCEDURE: Hold up an old newspaper and a box of facial tissue.
"What happens to these after we are done with them?"
(thrown away).

"What else could we do with them?" (Hopefully someone will suggest re-cycling).

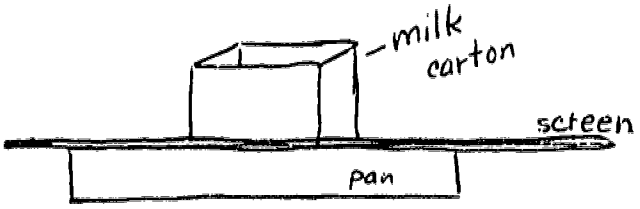
"We have learned what CYCLE means, and we have heard the word re-cycle, but what does it mean to RE-CYCLE?"

"When we put re in front of a word it means again. What does reheat mean? Re-read? Rebuild? Remarry?"

"And what does re-cycle mean?" (get definitions from students).

"Today we are going to re-cycle some facial tissue into paper."

Set up the following where all can see:



For a section of 1 gallon milk carton use the following recipe:
- 5 facial tissues (not "wet strength kind" - they are hard to break down).
- 4 tablespoons of starch (approximately)
- 5 cups of water (approximately)

(1/2 gal. section uses 2 tissues, 2 tablespoons of starch and 3 cups of water).

Place the screen on the pan and the carton on the screen.

Have a student tear the tissues into bits. Put them into the bowl of water with the starch. Beat well with an egg beater till it is very pulpy and fibrous.

Pour the contents through the carton section (which acts as a collar) and the screen, into the pan. The fibers will collect on the screen.

Remove the milk carton section.
Press a blotter against the fibers, till no more liquid runs into the pan.

Carefully lift the screen, with the fibers, off the pan. Place on a cloth.

Put a blotter on top of the fibers and press gently with a medium hot iron until fibers are dry enough to peel off screen.

After you have peeled the paper off, continue ironing it until it is quite dry.

"This is a piece of 100% re-cycled paper." Perhaps each student would like to write his or her initials on it.

Show the overhead of paper re-cycling.
"Many people work to help re-cycle paper. For every ton of paper we re-cycle we save 17 trees. What jobs would need to be done to re-cycle this paper?" Refer to overhead and discuss.

EVALUATIVE ACTIVITY:

Divide up the class into small groups. Give each group paper, pencils, and one of the following articles.

grocery bag	Christmas cards
shoe box	newspaper
magazine	lunch sack
gift-wrap paper	milk carton

"Even before paper is sent to be recycled into more paper, there are many ways to re-use it. How many ways can you list to re-use these paper products? Be creative! Use your imagination!"

Allow about 10 minutes, then have the groups share their ideas. (Some of the ideas might make fun art activities for later!)

SUGGESTED EXTRA ACTIVITIES:

Develop an "environmental crisis" bulletin board by having students bring in headlines, pictures, etc. on the theme of waste-disposal and litter problems.

Draw radiating rays from the headlines in the center out to titles of jobs which are related to the environment.

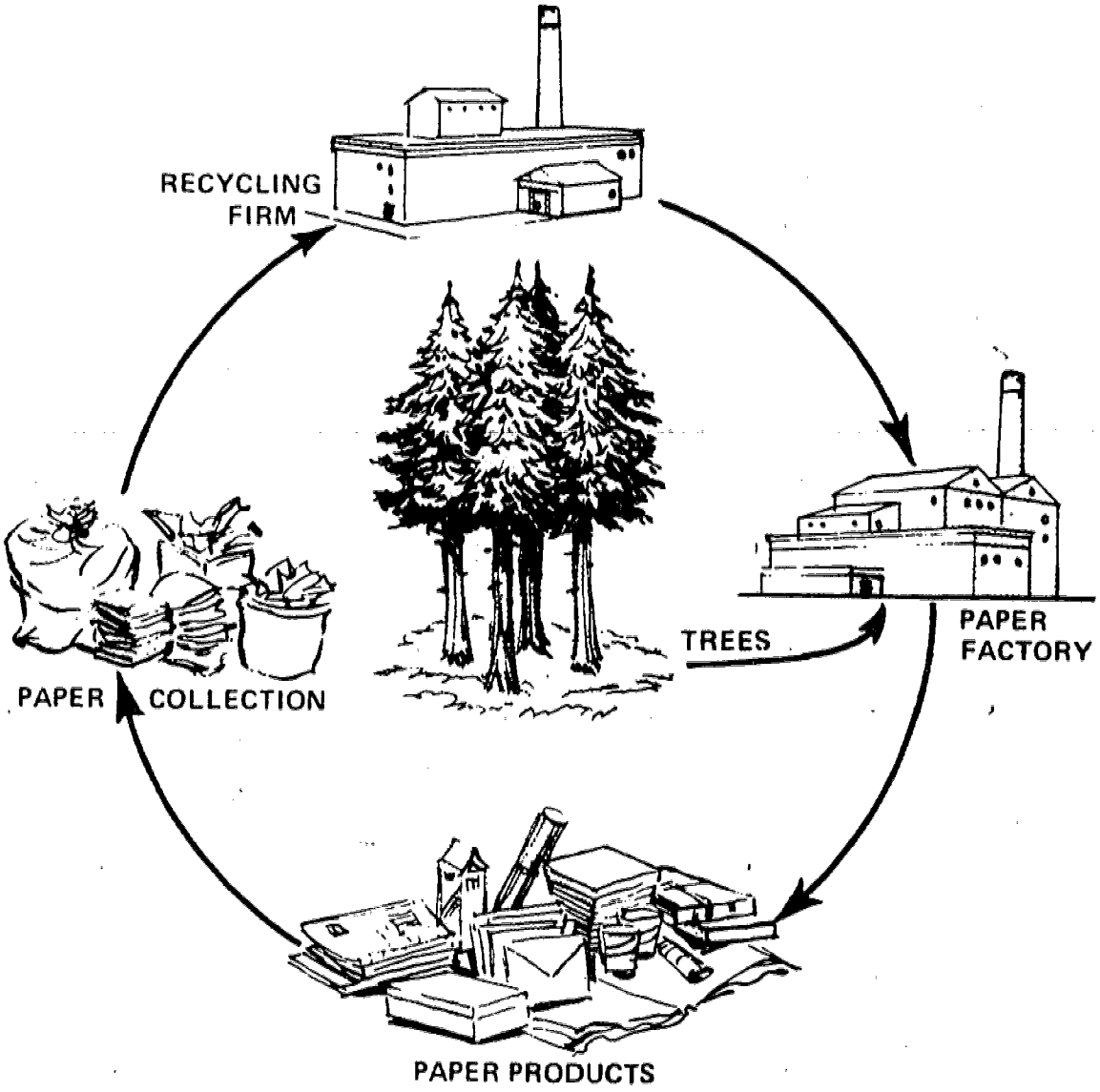
How many ways can you think of to re-use coat hangers, coffee cans, plastic bleach bottles, glass jars, plastic and metal lids? Who can make the longest list?

Actually make some items out of used things. See the article in Redbook, June 1973, "89 Things to Make Out of What you were Going to Throw Away" by Kay Sullivan.

Some students may want to find out about tree farms and reforestation programs and make a report to the class.

Start a paper re-cycling campaign at your school. Set up regular times for students to bring in paper. Arrange for transportation to get the paper to a re-cycling point. Make posters and flyers to advertise what is happening. Get everyone involved! (See page 11-5 for a list of places which accept paper for recycling.)

Arrange a field trip to a paper mill if there is one in your area. Find out how paper to be recycled is used in the manufacturing of new paper.



Make a transparency.

Lesson 11

CONCEPT: Many items that we often throw away (and which do not decompose) could be re-cycled if everyone knew about how you do it and were willing to help.

MATERIALS: Film Strip "Re-cycling: An Ecology Study".

PROCEDURE: *"What other things can be re-cycled besides paper?"* (cans, glass)

Show filmstrip - "Re-cycling: an Ecology Study"

"Where can a person take things to be re-cycled around this area? How can we find out about these places? Are there rules about what kinds of things they will accept?"

"Is it convenient to take each can, bottle or paper to the place one at a time? What would be better?" Suggest that a box for keeping things to be re-cycled until time to take them to a drop-off place might be helpful, as well as providing the re-use of a box.

"How could you set it up if you had several boxes?" (One box for glass, one for cans, one for paper).

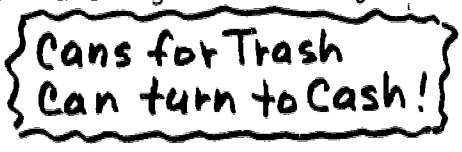
"Does your family re-cycle things? Would they? Do you think other people in your community would?"

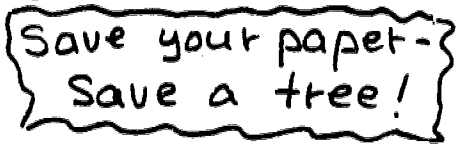
"Often people would be willing to re-cycle things but
1) they don't have any organized way of saving their things and
2) they don't know where to leave them for re-cycling."

"Let's help them out. We can design re-cycle collection boxes and list close-by drop-off points for glass, paper, and cans. People can keep these boxes and fill them up with things to re-cycle, empty them at the proper place when they're full, and bring the boxes back to fill again and again. We can try to convince people that re-cycling is a good way to protect our future environment."

Divide the class into three groups: one for glass, one for cans, and one for paper.
Each group will be responsible for:

1. gathering 30 sturdy boxes to use as collection boxes.
2. decorating them if they wish.
3. labeling them with eye-catching labels - such as:





4. finding out where nearby drop-off points for these materials are located.
5. pasting a paper to each box listing:
   convenient places for pick up of this material,
   any rules and limitations (i.e., clear glass only, no magazines, or aluminum only, etc.)

6. preparing a 2-minute radio commercial to "sell" people on the idea of re-cycling -- be creative!

   (You may be able to find a local radio station that is willing to broadcast one of these --- call around and ask --- possibly KQIN in the Highline School District The number is 243-8803.)

7. thinking of other ways to advertise recycling as a vital conservation effort to protect earth's future and convince people that they must help.

This information was compiled by a 7th grade Camp Fire Girls group, "Tanki Da Kanya", from Pacific Junior High School, Mrs. John Benedict, Advisor, TR 8-7569, and under the further assistance of Cliff Maudslien, Highline Public Schools, 433-2453.

THE DAILY REFUSE LOAD OF YOUR FAMILY IS OVER 6 POUNDS!

HELP LIGHTEN THE LOAD BY RECYCLING!

GENERAL RECYCLING STATIONS

Burien
Rob's Texaco - 136th & Ambaum Rd., 246-1535
Buys - All recyclable beer bottles - 40¢ case
Aluminum cans - 10¢ a pound
Newspapers - 4¢ for 10 lbs., $8.00 a ton
Hours open - 10:00-6:00 Mon.-Sat., 10:00-5:00 Sun.

Des Moines (and White Center, CH 4-2233)
Northwest Reclamation Co., S. 223rd & Marine View Drive, TR 8-2431
Buys - All recyclable beer bottles - 40¢ case
Aluminum cans - 10¢ pound
Newspapers 4¢ for 10 lbs., $8.00 a ton
Will accept all glass food containers - no pay.
Hours open - 10:00-6:00 Monday-Saturday
They donate 10% of their proceeds to Children's Orthopedic Hospital.

Seattle
South Transfer Station, 2nd Ave. So. & So. Kenyon St. Will accept all glass food containers (no window glass), newsprint and metal. No pay. Open 24 hours a day. Closed only from 5:00 p.m. on Saturday to 9:00 a.m. on Sunday. This station is run by the City of Seattle. It has an unlisted phone number. For further information call Seattle Solid Waste, 583-2780.

Midway
Cascade Recycling, 23898 Pacific Highway So.

Rainier, Olympia and Lucky - 40¢ case
Heidelberg, Reinlander and Blitz - 25¢ case
Also, aluminum cans - 1¢ for 2 cans
Open Monday-Friday, 10:00-7:00, Saturday and Sunday 9:00-6:00. (Call for group rates).

GLASS

General Instructions: Glass should be clean, sorted as to color (white, brown, or green) and lids and metal rings should be removed. No window glass please!

Northwestern Glass, 5801 E. Marginal Way, RO 2-0660. Recycles any beverage glass 1¢ a pound. Open Tues. & Thurs., 9:00-2:00, Sat. 8:00-4:30.

Rainier Brewing Co., 3100 Airport Way So., MA 2-2600. Recycles Rainier beer bottles, 50¢ per case. Open 9:00-6:00 Monday-Friday. Also buys aluminum cans 10¢ a pound.

Glaser Beverage, 2300 26th So., EA 3-2932. Will recycle all kinds of glass or glass containers. Pays 1¢ per pound. Open Monday, Wednesday and Friday 10:00-2:00.

GLASS FOR BOY SCOUTS

The following places are collecting glass for Boy Scouts. They accept all glass containers and are open any time. For further information call PA 5-5200.

A & P, Rainier So. & Empire Way So.
Govmart Bazaar, 501 S. W. 148th
Thrifty Drugs, So. 120th & Des Moines Way So.
Westwood Village, 2500 S. W. Barton St.

RECYCLING FOR RAINBOW

Herb & Leona Miller, 2051 So. 223rd, Des Moines, TA 4-2308. Will accept all glass containers (no medicine bottles). Also newspapers and old telephone books.

> The average person uses 1 bottle per day. The average family of four uses an excess of 1,600 bottles yearly. Do you throw yours away? Why?

OIL IS YUCKY!

Crank case oil causes pollution when it is poured into sewers or is burned. The following service stations will accept used crank case oil for a fee of 25¢ for 2 gallons and 10¢ per gallon for additional amounts.

Chevron - 2555 15th Ave. W.
Dale Yust - 2437 California S. W.
Enco - 9255 16th Ave. S. W.
Rocket - 6217 Rainier Ave. So.

The oil is re-refined at Superior Refineries, Inc., Woodinville.

PAPER

General Instructions: Paper should not include magazines or slick paper. Preferably have paper tied in 1 foot bundles.

Independent Paper Stock Co., 66 S. Hanford, MA 3-3228. Takes many grades of paper - prices vary as to grade. 500 pound minimum for low-grade paper. Open Monday-Friday 8:00-3:30.

Wash. Excelsior Co., 531 So. Portland St., Seattle, RO 7-4388. Newsprint only. Tie in 30 lb. bundles. Pay $9.00 per ton. Open Monday-Friday 8:00-5:00, Saturday 9:00-12:00. (Hard to find - call for directions).

Highline Sportsman Club, 11220 26th S. W., CH 4-7258. Newsprint only. Call for pickup. No pay.

Mormon Church (church of the Latter Day Saints), S. W. 142nd & Ambaum Blvd. S. W. Leave newsprint only at home of Mr. Sims, 14608 18th S. W., CH 4-3539 or by garage at 13717 6th Ave. S. W. Proceeds used for needy church members. Call CH 2-3405 or CH 2-9979 for information.

Old magazines are needed at old folks homes. Following are some that want them. They prefer ones with bright pictures.

Olympia Crest, 21428 Pacific Highway So., TR 8-2042. Open 8:00-4:00

Seatoma Convalescent Center, 2804 S. 224th, Kent, TA 4-0600. Open 11:00-3:00.

Federal Way Convalescent, 1045 So. 308th, Federal Way, VE 9-2400. Open anytime.

RECYCLE CLOTHES

Take useable clothes to the Highline PTSA clothing depot, a small portable directly behind the Highline School District's former Administration building at 253 So. 152nd, Monday 9:00-12:00 and Thursday 9:00-2:00. Call Mary Delehoy, TR 8-8056 or Bea Lemmel (Highline Association of Educational Secretaries Welfare Committee) 433-2523. These clothes will be redistributed in the Highline area. Thanx!

VALUE VILLAGE

The Value Village at 16033 1st Ave. So. needs your extra paper bags and coat hangers. Also needs donations of clothes, furniture, household items, etc. Proceeds go to the Northwest Center for the Retarded.

METALS

General Instructions: Cans should be cleaned, labels removed, ends removed and cans flattened.

American Can Co., 2601 Elliott Ave., MA 3-8100. Buys all types of food containers (steel, aluminum and combinations). Open 8:00-4:30 Mon.-Fri.

Cascade Recycling, 23898 Pacific Highway So. Buys aluminum cans, 1¢ for 2 cans.

Lang Distributors, Inc., 2415 Airport Way So., 622-3630. Buys aluminum cans - 10¢ per pound. Open 10:00-2:00 Monday-Friday.

Pacific Iron & Metal, 2230 4th Ave. So., MA 3-7236. Buys all non-ferrous metals (no iron). Takes brass, aluminum, copper, lead and zinc. Open 8:00-4:30 Monday-Friday, 7:00-12:00 Saturday.

Puget Sound Salvage, 2960 4th Ave. So., MA 2-0359. Buys copper, lead, zinc and brass. Open 8:00-5:00 Monday-Friday, 8:00-12:00 Saturday.

Rainier Brewing Co., 3100 Airport Way So., MA 2-2600. Buys aluminum cans - 10¢ per pound. Open 9:00-6:00 Monday-Friday.

Reynolds Reclamation Center, 923 So. Bayview, 622-0433. Buys aluminum cans - 10¢ per pound. Open 9:00-4:30 Tuesday-Saturday.

Sid Eland, Inc., 1022 E. Marginal Way So., RO 2-2211. Buys aluminum cans - 10¢ per pound. Open 1:00-5:00 Monday-Friday.

Sternoff Metals - Seattle Plant, 7201 E. Marginal Way So., RO 2-8100. Buys all non-ferrous metals (no iron or steel). Open 8:00-4:30 Monday-Friday.

Sternoff Metals - Renton Plant, 7430 So. 180th, BA 6-7400. Buys iron and steel. Takes old car bodies: remove gas tank, seats, floormats, and tires. Must have clear title. Pays between $8.00 and $15.00 according to weight.

Prices on all metals but aluminum vary as to type and grade. Call for prices.

NEIGHBORS IN NEED

While recycling don't forget Neighbors in Need. Many items including food, clothing, furniture, bedding and toys are needed - especially for babies and small children. For further information call Helen Gilmore at TR 8-8406.

Des Moines Food Bank at Des Moines United Methodist Church, 22225 9th So., TR 8-8301.

Glendale Lutheran Church, 13455 2nd S. W., CH 4-9400.